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The unintended consequence of an export ban: Evidence from Benin's shrimp sector*

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Abstract

The inability of Benin to comply with EU food safety standards led a suspension on its shrimp exports from July 2003 to February 2005. The impact of the export ban is studied in an open-economy, supply-demand framework; by means of qualitative interviews and analysis of household survey data. The ban had a negative welfare impact on the shrimp-exporting firms, the fishmongers and the artisanal fishermen. More importantly, the negative impact persisted several years after the ban was lifted. Exports did not revive because of the poor institutional environment in Benin, as well as the smallness of the shrimp sector. For the fishermen, the ban resulted in a persistent welfare loss because their coping strategies were deficient. They were locked in the fishery sector, and the domestic and regional demand for shrimp could not fully compensate for the loss of the EU market.

Keywords: EU food safety standards, trade, aid, shrimp, Benin

JEL classification codes: F1, O13, Q17, Q18

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1. Introduction

The WTO agreements on sanitary and phytosanitary measures in 1995 inaugurated important changes in the food safety and quality standards of major food importing economies (e.g., the EU, the USA and Japan). More food standards were being imposed that apply to more products and to more substances. The standards have also become tighter, and full traceability is required through Hazard Analysis Critical Control Points (HACCP[1]) in the food-processing industries of these countries as well as in those of their trade partners. Furthermore, there are now more internal and border food-safety controls, which increase the probability of detection of non-compliance (European Commission, 2009).

While these measures are likely to have achieved their primary objective of improved consumer-health protection in developed economies (e.g., Golan et al., 2000), they have come at a cost as producers need to devote additional financial and human resources to complying with them. Producers are also facing new risks, including withdrawal of their product from the market, rejection of exports at the border, destruction of shipments, or, in the worst case – an outright export ban on all products from the company or the sector involved (e.g., Batz et al., 2011).

These additional costs and risks have raised concerns that standards may act as non-tariff barriers to trade for those countries and small-scale producers with relatively few resources and limited expertise, possibly leading to their exclusion from lucrative export markets (e.g., Garcia Martinez and Poole, 2004; Gibbon, 2003; Henson, and Loader, 2001; Kherralah, 2000; Reardon et al. 1999; Key and Runsten, 1999; Farina and Reardon, 2000; Unnevehr, 2000).

Other observers have noted that the new landscape of stringent and rapidly evolving standards may provide opportunities for developing countries to upgrade their export sectors by means of increased foreign direct investment and vertical integration (e.g., Jaffee and Henson, 2005; Henson and Jaffee, 2006). For example, in order to

[1] HACCP is a systematic preventive approach to food safety that addresses physical, chemical, and biological hazards as a means of prevention rather than finished product inspection. The system is used at all stages of the food-production and preparation processes; including packaging and distribution, in order to assure traceability of hazards throughout the entire supply chain.

comply with standards, multinational firms involved in food exports from a developing country may invest more resources, interact more with the local small-scale producers, and provide them with inputs and technology (Gow and Swinnen, 1998; Maertens and Swinnen, 2009).

The mixed evidence suggests that no simple general conclusion can be drawn about the impact of standards on food-export sectors in developing countries and that research efforts should be directed to uncovering the mechanisms underlying their heterogeneous impact. This paper contributes to this uncovering. We present an in-depth case study of Benin's shrimp export sector, which was confronted with a ban on exports to the EU in July 2003 after more than 30 years of export partnership.[2] The ban was triggered by the failure of the sector to comply with EU-food safety standards and lasted for almost two years, being lifted only in February 2005. We describe the events leading to the ban and study its short and medium-run impacts at the level of the exporting firms and the small-scale actors (fishermen and fishmongers).

A number of studies have looked at the impact of an export ban triggered by non-compliance with food standards (e.g., Alavi, 2009, Dey et al., 2005, Yunus, 2009, Cato and Santos, 2000, Calzadilla-Sarmiento, 2002, Keizire, 2004; UNIDO, 2002). While most of these studies document huge compliance costs and thus negative short-run effects when the ban is imposed, they also show a revival of the export market when the ban is lifted. The medium- and long-run impacts have generally been found to be positive. For instance, Yunus (2009) estimates the short-run cost of the 1997 EU ban on Bangladesh shrimp export at $25 million but estimates the gain at $18 million in the first year and additional yearly gains of $35 million starting from the second year. Keizire (2004) and Henson and Mitullah (2004) reach similar qualitative conclusions for the impacts of an EU ban on the fishery export sector of Uganda and Kenya, respectively.

Our study, however, examines a case in which the export sector did not resume, even after the ban was lifted. Another distinctive feature is that we investigate the consequences of the ban both at the firm level and the level of small-scale producers.

[2] The ban was actually self-imposed by the Beninese government under pressure by the EU; see Section 2 for details.

Previous studies on export bans have been concerned almost exclusively with the firm-level impact.

To study the firm-level effects, we rely on trade data as well as semi-structured qualitative interviews conducted in 2009 with the exporting firms, fishmongers, government staff, donors, and credit managers in the banking sector. The ban had a negative welfare impact in 2003 and shortly thereafter, and this effect persisted through 2009, four years after the ban was lifted. We can extend this conclusion to the present because, at the time of writing this paper, Benin's shrimp export sector has yet to recover. We argue that the sector's smallness, as well as Benin's weak institutional environment contribute to explaining the persistently negative impact of the ban. We illustrate our argument in the standard open-economy supply-demand framework (e.g., Baldwin and Wyplosz, 2009 and Krugman et al., 2011).

For the empirical analysis at the level of small-scale actors, we use survey data on 540 fishermen and fishmongers, collected by the authors of this paper and a team of enumerators. The survey was conducted in 2009, four years after the ban was lifted, to determine the experience of fishermen and fishmongers with the ban and its aftermath. While the data do not allow the use of econometric analysis to attribute welfare effects to the loss of exports to the EU, the interviews with the small-scale actors do provide substantial suggestive evidence for a large and persistent negative welfare impact. In particular, the information received from our respondents indicates that, with the ban, the prices for fresh shrimp and quantities demanded declined and that the fishermen have not been able to reallocate labor to other productive activities in any substantial degree. In fact, instead of finding alternative employment outside the fishery sector, most shrimp fishers have increased their intensity of fishing fish and so compete with fish fishers. Hence, both the shrimp and the fish fishermen reported negative income effects of the ban, the latter because of increased competition for catching fish, the former because of the loss of the lucrative export market.

The next section presents the general background of this study by giving an overview of the fishery exports of developing countries to the EU and highlighting the importance of standards and export bans in the fishery-export sector. Section 3 provides

information on Benin's shrimp export sector, the events leading up to the ban, and the responses of different actors to the ban. Section 4 sketches the impact of the ban on the exporting firms and the small-scale actors in an open-economy, supply-demand framework. Section 5 relies on survey data to examine the underlying mechanisms of the impact on the small-scale actors. Section 6 contains discussion and concluding remarks.

2. EU food standards and fishery exports from developing countries

A recent study by Batz et al. (2011) indicates that the EU's food standards are among the most stringent in the world. The EU uses three strategies to maintain its system of quality control on its food imports. First, regular missions are undertaken by the veterinary office staff (DG SANCO) to screen the entire supply chain of the EU trade partners. Second, border controls are applied systematically to goods entering the EU market. Third, internal quality controls are conducted on products that are already on the EU market.

Data on these border and internal controls are reported in the Rapid Alert System for Food and Feed (RASFF), which enables member countries to share information about the risks related to food and feed items in real time.[3] The notifications reported in the RASFF can be broadly divided into three categories: alert notifications concerning products with high risks that are already on the EU market for which rapid action is required; information notifications about products with risks that do not require immediate action; and border rejections of candidate products.

The number of notifications in RASFF has increased over time. Over the period 2003-2011, for instance, the number of alert notifications increased from 452 to 617 while information notifications and border rejections increased from 302 to 1,253 and from 1,550 to 1,816, respectively (European Commission, 2010 and 2011).

RASFF also provides information on the actions taken in response to the alert and information notifications. These actions typically depend on the severity of the risks involved and the frequency of the notifications and vary between a withdrawal of the

[3] The RASFF notifications include risks on food, feed and food-contact materials. The legal basis for the RASFF was put into place in 2002, but the system has been in operation since 1979. Current members of RASFF include all of the EU Member States along with Iceland and Liechtenstein.

product from the market, destruction of the shipment, and re-dispatching. Furthermore, upon repeated notifications, a mission from the veterinary office is sent to the country involved. In the aftermath of such a mission, the country could face the worst-case scenario, i.e., an outright ban of all similar products from a certain company or from an entire sector.

Due to the intrinsic product-specific sanitary risk, the fishery sector is profoundly affected by the EU food safety standards. For instance, fishery products account for the largest share of notifications among all imported food products (Jaud et al., 2009), and data from RASFF indicate that fishery products accounted for almost one quarter of the total borders refusals and one third of the export suspensions in 2008-2009. Despite these challenges, fishery exports from developing countries have increased. For instance, over the period 1988-2005 fishery imports from developing countries to the EU almost doubled as a share of total EU food imports, rising from 5.6% to 10.9% (Jaud et al., 2009).

The sector's growth in the face of increasingly stringent standards is consistent with the view that food standards may act as catalysts that stimulate vertical integration, capacity building and innovation, thus increasing the sector's efficiency and competitiveness. However, other reasons may play a role as well, such as an increased demand for these products in advanced countries and economic growth in the exporting economies. Moreover, these aggregate figures hide a great degree of heterogeneity.

This is highlighted in Figure 1, which shows shrimp-export data from Benin and from Bangladesh to the world and to the EU. Both countries faced a ban on exports, the year of the ban being indicated in the figures with a vertical grey line. Panel (a) of Figure 1 shows that, upon the 2003 export ban, shrimp exports from Benin to the EU (and to the world) completely collapsed and remained close to zero for several years after the ban was lifted in 2005. Panel (b) shows the contrasting case of shrimp exports from Bangladesh to the EU, which dropped only slightly during the 1997 ban (which was effective from August to December) and afterwards skyrocketed, far exceeding their pre-ban levels.

The evolution of exports from China, Kenya, Malaysia, Mexico, Mozambique, Peru Tanzania, Togo, Uganda and Vietnam provides further support for the statement that "there can be no general conclusion". In particular, we find booms and busts of developing-country exports to the EU in the aftermath of an export suspension for fishery products. Among the contrasting patterns, one observation that emerges is that small market players (like Benin and Togo) that export almost exclusively to the EU suffer heavily and persistently from an EU ban, while larger players (such as Bangladesh, Vietnam, Malaysia, Kenya, and Uganda) that export to several destinations outside the EU are almost not affected, some of them not even in the short run.

The contrasting experience between Benin and Bangladesh is indicative of the heterogeneity that we observe among the other developing countries that encountered an export ban on fishery products. For instance, while Bangladesh exports only one third of its total shrimp exports to the EU, Benin exported over 90% of its shrimp exports to the EU. In what follows, we show that this dependency had far-reaching consequences for Benin, which were exacerbated by the smallness of the sector and the weak institutional environment, and – at least for the fishermen – the limited access to alternative income sources.

3. The EU and Benin's shrimp export sector: a painful divorce and shaky reunion

This section starts with an overview of the sector and its actors. We will then provide a detailed narrative of the 2003 ban and its aftermath.

3.1 Background on Benin's shrimp export sector

The main shrimp specimen in Benin is *Penaeus duorarum burkenroad*,[4] which migrates from the sea to inland waters to mature and (when not caught in the inland waters) returns to the sea after having reached adult size.[5] The shrimp are mainly caught in the southern

[4] This species represents more than 97% of the total shrimp production of the country and is also caught in other West African countries such as Cote d'Ivoire, Senegal, Cameroon and Nigeria.
[5] The shrimp lay their eggs in the sea. The larvae grow in the sea till about 7 to 8 mm and then migrate to the brackish water in the lagoon during the dry season when the inland water level is low (from January till

lakes of Nokoué and Ahémé and in the lagoon of Porto Novo.[6] Shrimp fishing is a seasonal activity that takes place during an 8-month period, from January, when the shrimp migrate to the inland waters, to August, when they return to the sea. The stock of inland shrimp available to fishermen fluctuates between years with rainfall playing the greatest role by determining the amount of nutrients in, and the salinity of, the water.

The inland fisheries of Benin are dominated by artisanal fishermen (male, with a few exceptions), who use small wooden canoes with paddles and/or sails. After being caught by the fishermen, fishmongers (mostly the fishermen's wives) collect the shrimp on the water from the canoes or at numerous landing sites and sell them directly to local consumers, to other intermediate traders, or to the collectors recognized by the exporting firms. In the last case, the shrimp are sent by vehicles fitted with isothermal containers to the exporting plants.

Before the ban (July 2003), there were 3 firms: CRUSTAMER, SOBEP and SFG. During the ban none of the three could operate. Following the lift of the ban in February 2005, CRUSTAMER and SFG re-opened but stopped exporting shrimp a few months later. In 2005, a new firm called DIAX entered the market. It is also the only firm operating at the moment (January 2013). DIAX specializes in the export of fresh langoustines, fish and shrimp. The other companies mainly exported frozen shrimp. For instance, the shrimp purchased by the largest company, CRUSTAMER, were peeled, frozen at –45° C, and exported mainly to Spain from where they are further distributed to other European countries (Colette, 2003).

Figure 2 gives an overview of the actors along the supply chain of inland shrimp. In addition to the three actors mentioned above, the overview includes two additional ones: the banks that provide the exporting firms with credit and the Directorate of Fisheries, which is the competent authority that controls and regulates fisheries in Benin. Their role in the supply chain is discussed below.

March). The shrimp mature in the inland water and migrate back to the sea when the salinity of the inland water has decreased and the water level has increased after the rainy season (around July-August). By that time, the shrimp have grown to a length of about 10 cm (Cummings, 1961; Hoestlandt, 1966).

[6] Lake Nohoué is the biggest contributor to the supply of shrimp. According to data reported by Allegre and Dupret (2010), its share is estimated at about 2/3 of the total shrimp supply, the combined share of Lake Ahémé and the Lagoon of Porto Novo is 1/6. The remaining 1/6 stems from other small lakes.

The shrimp sector represents an important source of employment in Benin. It has been estimated that, in 2002 (prior to the ban on export to the EU), the sector provided income to 45,000 fishermen, 18,500 female intermediate traders, 150 collectors recognized by the exporting firms, and 50 permanent employees and 1,200 seasonal employees (mostly women) of the exporting firms (BTC, 2007; Le Ry et al., 2007). In total, the shrimp sector created employment for 64,900 people, and so, when dependents are included – contributed to the livelihood of about 250,000 people in Benin or about 4% of the population.

In 2002, approximately a third of the 3,000 tonnes of shrimp caught on the three most important inland waters of Southern Benin (Lakes Ahémé and Nokoué and the Laguna of Porto Novo) were designated for export of mainly frozen shrimp destined for the EU market (BTC, 2007; Le Ry et al., 2007).[7] The remaining 2,000 tonnes, usually of a smaller size and poorer quality (in function of their freshness, cleanness, size and color) were dried, smoked or cooked and consumed locally.

Panel (a) in Figure 1 gives the evolution of Benin's shrimp exports to the EU over the period 1996-2009. In 1999-2001, we note a sharp increase of shrimp exports from about 300 to almost 630 tons of frozen peeled shrimp, which corresponds to a bit less than 1000 tons of fresh unpeeled shrimp. This rise was due to the expanding production capacity of CRUSTAMER (Colette, 2003). By 2002, shrimp was Benin's second most important export product after cotton. However, from 2002 onwards, the exports declined rapidly, falling from about 630 tons in 2002 to zero tons in 2004, the first year in which the ban on the export of shrimp was in force all twelve months of the year.[8] After 2004, the export turned slightly positive again but then plunged back to only 1.5 tons in 2009.

[7] Fresh and chilled packaging for export are also used.

[8] The revenue of exporting firms in 2002 amounted to 1,319 million XOF for CRUSTAMER, 792 million for SOBEB, and 1,066 million XOF for FSG. In the years from 2003 to 2006, however, revenues were lower at 746 million XOF; 279 million XOF; 644 million XOF; and 518 million XOF for CRUSTAMER and 545 million XOF; 0 XOF; 74 million XOF; and 0 XOF for FSG (PASP, 2007; no data available for SOBEB). As the official exports presented in Figure 1 were zero in 2004, CRUSTAMER's revenue of 279 million XOF in that year may have been the result of informal exports to neighboring countries or other activities.

3.2 The ban

In August 2002, Spain sent an information notification to the RASFF about the presence of a high proportion of bacteria (*Enterobacteriaceae*) and micro-organisms (aerobic mesophiles) detected in a sample of frozen shrimp imported from Benin. Following this notification, the EU Food and Veterinary Office (FVO) conducted its first inspection of Benin's shrimp sector in October 2002.

The inspection report pointed to the following six main deficiencies (EU DG SANCO, 2003): (1) shortcomings in Benin's legislation with respect to hygiene and the control of fishery products; (2) lack of human resources at the competent authority; (3) lack of EU-accredited laboratories to monitor the safety norms applied to shrimp; (4) the non-conform use of chlorine and additives by exporting firms; (5) the non-application of Hazard Analysis Critical Control Points (HACCP) in exporting firms; and (6) bad practices with respect to hygiene and the environment at the level of the small producers and small intermediate traders. Among others, this last deficiency refers to the practice of fishermen keeping the shrimp on the surface of their wooden canoes instead of preserving them in isothermal containers with ice.

Given these deficiencies, the FVO suggested that the Beninese government suspend its fishery exports to the EU and correct them. Not doing so would increase the risk of an official EU ban on Benin's fishery exports (SFP, 2003). Hence, following the decision of the Beninese Minister charged with fisheries, the self-imposed ban on exports to the EU was signed on July 11, 2003.[9,10]

Since the shrimp season extends from January to August, the exporting firms had large quantities of frozen shrimp in stock when the auto-suspension was signed. The FVO requested that 189 tons of shrimp be destroyed at CRUSTAMER and SFG (Le Ry et al.,

[9] This decision is also triggered by an *alert notification* sent in June 2003 to the RASFF by the Netherlands that reported the presence of a prohibited substance (chloramphenicol) in shrimp imported from Benin.
[10] Since this was a self-imposed ban and not a suspension officially imposed by the EU, Benin remained officially on the list of countries that could export fishery products to EU.

2007).[11] More importantly, the entire export sector was officially put on non-active for almost 20 months until the ban was lifted.

3.3 Improvements in the aftermath of the ban

The ban was lifted in February 2005 following significant improvements in conforming to the EU safety norms. In particular, the government updated the legal codes, strengthened the Competent Authority, and upgraded three laboratories. The exporting firms resolved the nonconformities and adopted the HACCP system (Hazard Analysis and Critical Control Points) (UNIDO, 2010).

One of the biggest challenges was ensuring the traceability and responsibility of all the actors along the chain. Since 2004, the EU regulations have required auto-controls at all levels of the supply chain rather than leaving the control up to a central laboratory. In order to enable fishermen to respect safety norms and collectors to control the quality of shrimp purchased, facilities were constructed, which included the transformation of rudimentary landing sites into *transfer platforms* (TP) for receiving, selecting and rinsing shrimp before putting them in isothermal containers with ice.[12] In addition to the TPs, *control units* (CU) were established to sample loads of shrimp for quality control.

These improvements were to a large extent financed by the donor community and implemented in collaboration with the Beninese government agencies and other local actors. Thanks to this joint effort, Benin made it to *List 1* in December 2009, which gives a select number of "harmonized" or "approved" countries that are allowed to

[11] A document by Allegre and Dupret (2010) mentions that these 189 tons are distributed across the three firms as follows: 73 tonnes for CRUSTAMER; 68 tonnes for SOBEB; and 48 tonnes for FSG. The value of these stocks are estimated at 307,727,061 XOF, 201,492,600 XOF; and 183,278,100 XOF (Allegre and Dupret, 2010). These numbers represent about 181%, 183% and 183% of the value of the capital stock CRUSTAMER, SOBEB and FSG, respectively.

[12] The location of TPs around the lake should allow fishermen to reach a TP within less than an hour and a half. At the site of the CUs, ice will be produced in order to refill the containers used by collectors and fishermen. The infrastructure works at Lake Ahémé, financed by Belgian Technical Co-operation, were completed in 2010. Four TPs are also under construction in the lagoon of Porto Novo with financial support of the government and several donors (Beyens, 2010).

exportfishery products to all EU countries without being subject to additional legislation on the part of individual EU countries.[13]

3.4. Failure to restart export activities

So far, this story shows that the standards acted as catalysts for investment and innovation in the sector. However, as we write, a stable reunion of Benin's shrimp export sector with the EU is far from established. While the compliance gap between the Beninese shrimp sector and the EU norms has been reduced, there is much uncertainty about whether it can keep up with rapidly evolving EU norms. This uncertainty is reflected in the attitude of the banking sector. For instance, from a number of interviews with credit managers, we learned that the banks are reluctant to provide credit to the exporting firms not only because of high firm debt[14] (resulting from losses due to the ban) but also because of the increased perceived riskiness of the shrimp-export activity since the ban.

The uncertainty surrounding the sector is rooted in a number of factors. First, the transfer platforms had been constructed only at Lake Ahémé and not at the other lakes, raising concerns that the supply of shrimp to the exporting companies would be insufficient to cover operating costs.

Second, although the compliance gap narrowed considerably in the aftermath of the ban, a number of issues dragged on for several years: (i) Until late 2009, the firms were still under the EU regulation 2076/2005/CE, according to which they could export fishery products only by means of bilateral agreements with a few EU countries: Belgium, France, Spain, The Netherlands and France. This kept the firms from exporting to potential clients in the UK and Germany. (ii) Up to the present (January 2013), the

[13] See the Commission Decision 2009/951/UE of December 14, 2009. Each of the three exporting firms (CRUSTAMER, FSG and DIAX) also obtained DG SANCO approval to export fishery products to the EU on December 18, 2009 (SFP, 2010). Prior to Decision 2009/951/UE; Benin was operating under Decision 2076/2005/CE, so the country could export fishery products only under bilateral agreements with four EU countries: Belgium, France, The Netherlands and Spain.

[14] The amount of the firms' debt with banks and other financial institutions was estimated at 1,271 million XOF for CRUSTAMER in 2006, 1,070 million XOF for FSG in 2005 and 462 million XOF for SOBEB in 2003 (PASP, 2007). These numbers are very high compared to the values of the firms' capital stock: 170 million XOF, 110 million XOF, and 100 million XOF for CRUSTAMER, SOBEP, FSG, respectively.

laboratories used by the Benin Competent Authority have yet to meet the EU ISO/IEC-17025 norm, which grants the right to check for chemical substances and water quality. Without this accreditation the risk of refusal to enter the EU markets is high.

Third, it is not clear whether the local institutional environment is able to manage a high-quality high-risk supply chain. After all, the recent reduction in the compliance gap was heavily supported by donors instead of being a homegrown success of the local institutions.[15] While donors financed the new infrastructure in place, it is not clear whether local institutions can effectively maintain and operate it. For instance, a project manager from one of the donor institutions involved noted that the local actors do not possess enough expertise or financial resources for the management of the transfer platforms, that the control units at some of the transfer platforms lack the high-power energy needed to function, and that the control units as well as the newly established laboratory lack qualified technicians (see also BTC, 2011). Hence, the concern that, as long as the sector remains dependent on the EU market for its exports, it may face a new export ban in the future.

Fourth, the profitability of the exporting activity decreased following the ban not only because the firms had to employ additional human and physical capital to comply with the standards but also because both the local and international market for frozen shrimp evolved since the ban. Local intermediate traders were supplying more and more to neighboring countries. On the demand side, several European clients had turned to other suppliers and particularly to the Asian market.

Because of these issues, the prospects of a swift recommencement of activities were low, which reduced the firms' credit rating. In fact, banks were willing to pre-finance the shrimp export campaign only if the government agreed to guarantee them. In July 2008, the government announced at the Council of Ministers the decision to guarantee bank loans to the shrimp exporting firms. However, it is not clear why this

[15] For instance, the construction of landing sites at Lake Ahémé as well the establishment of a new laboratory were almost entirely financed by the Belgian Technical Co-operation. Moreover, while it was decided that the Beninese government would contribute about 12% of the total cost of the infrastructure works (euro 3,033,055), at the moment the government only fulfilled about 8% of his contribution (BTC, 2011).

decision has not become effective (Allegre and Dupret, 2010). One pending issue is the failure of exporting firms to justify the use of a soft government loan of 500 million XOF (≈ 763,000 €) they received in 2007-2008 in order to make the investments required for compliance with the EU standards.

The next section illustrates how the combination of these factors blocks the export market activity in Benin's shrimp sector.

4. The impact of the ban: an open-economy, supply-demand analysis

We model the market for shrimp in Benin by focusing on the involvement of three main actors: (i) fishermen; (ii) local consumers in Benin and in neighboring countries; and (iii) the exporting firms. We do not explicitly present the welfare analysis of fishmongers, but the effects go in the same directions as those of the fishermen.

Fishermen supply two qualities of shrimp: high and low. The high quality shrimp is characterized by its larger size, pink color and freshness. Exporting firms buy only the high quality, whereas local consumers may buy both high and low quality shrimp.

We integrate these features into the standard open-economy, supply-demand framework (e.g., Baldwin and Wyplosz, 2009 and Krugman et al., 2011) and demonstrate the impact of the export ban on firms and fishermen. Section 4.1 models the main features of Benin's market for fresh shrimp before the ban, i.e., when the exporting firms were operating. Sections 4.2 and 4.3 illustrate the short-term and medium-term impacts of the ban, respectively. Our time frame for the short-run is the period under which the ban was in force, i.e., from July 2003 till February 2005; while the medium-run time frame stretches from February 2005 - when the ban was lifted – to 2009, when we conducted our survey.

4.1 The Model and the situation prior to the ban

We make the following four assumptions. First, fishermen supply shrimp every day; q_b^d low-quality shrimp to local consumers and q_g^d and q_g^X high-quality shrimp to local consumers and exporting firms, respectively. The prices related to these quantities (q_b^d, q_g^d and q_g^X) are denoted by p_b^d, p_g^d and p_g^X where $p_b^d < p_g^d \leq p_g^X$. Second, the supply

curves of the two qualities of shrimp are assumed to be identical and denoted by S_g and S_b, respectively. Each supply curve is a positive function of the shrimp price. Third, the supply is bounded by the available stock of shrimp in the lakes, which depends on weather and environmental conditions as well as on past fishing intensity. We denote the stock of each quality of shrimp by ${q_b}^*$ and ${q_g}^*$, respectively.

The fourth assumption we make is that local consumers and fishermen are price takers, i.e., they cannot determine the market price for shrimp. The exporting firms are price takers on the world market as they cannot determine their export price p_w. On the contrary, the handful of exporting firms set the price p_g^X at which they acquire shrimp from fishermen and buy at this price as long as they earn a markup ε equal to $p_w - p_d^g - c$, where c represents the expected marginal cost (including the costs of transporting, treating, freezing and packaging the shrimp as well as the cost of external financing from banks).[16] Thus, the demand curve of the exporting firms, D_g^X, is assumed to be perfectly elastic.

Figure 3 (a)-(c), summarizes our open-economy, supply-demand model for the market of fresh shrimp in Benin. Panel (a) presents the situation before the ban, i.e., at the moment when the exporting firms were operating. Panels (b) and (c) show the short-run and medium-run impacts of the ban, respectively. Each panel has three diagrams: the left and middle diagrams represent the domestic market for low and high quality shrimp, respectively, while the diagram on the right gives the export market for high quality shrimp.

In the right-hand diagram of Panel (a), exporting firms break even at the quantity q_g^X for which they pay a unit price p_g^X to the fishermen. For the same quality of shrimp, local consumers are willing to pay only $p_g^d,\ p_g^d < p_g^X$, (middle diagram of Panel (a)). As a

[16] From our interviews with the exporting firms' managers, we learned that the largest of the four firms is the market leader and sets the price when the shrimp season starts. The other firms follow. Data reported by PASP (2007) and information derived from our fieldwork indicate that, prior to the ban p_g^X was set at about 2 euro per kg, while the exporting firms received a price p_w of about 6.5 euro per kg. Thus, $p_w - p_g^X$, was 4.5 euro per kg and we can hypothesize that $c + \varepsilon \leq 4.5$ euro.

result, fishermen sell all of their good quality shrimp to the exporting firms.[17] Under these assumptions and given the world price of shrimp p_w and operating costs c, exporting firms derive a profit represented by the purple area HIJK in the right diagram.

The producer surplus of fishermen has two parts: one related to their supply of the low quality to domestic consumers, which is represented by the green area ABp_b^d in the left diagram; and the other is derived from the supply of high quality shrimp to the exporting firms given by the domain CEF in the middle diagram. The latter can be further split into two parts: the green area DEG represents what the fishermen would obtain if they sold all high-quality shrimp to local consumers, and the dark red area $CDGF$ represents the additional welfare fishermen obtain by selling a larger quantity at a higher price to exporting firms.

The export regime represented in Panel (a) is not beneficial for local consumers as it deprives them of high quality shrimp. Their loss is represented by the area CDG in the middle diagram. Note, however, that the welfare gain of the fishermen under the export regime is much greater than the welfare loss of the local consumers. The area CFG represents this positive net welfare gain. Besides, the exporting firms also create employment and contribute to the foreign reserves of the central bank, adding to the overall positive welfare impacts of the export regime.

Therefore, under the export regime, both the local producers and the exporting firms benefit largely because the prevailing world price of shrimp enables the exporting firms to purchase all good-quality shrimp from the artisanal fishermen at a price higher than what fishermen would obtain locally but low enough for the firms to make a profit.

4.2. Short-run impacts of the export ban

Panel (b) illustrates the short-term impacts of the export ban. In the right diagram, it causes the demand D_g^X from the exporting firms to shift down to zero. As a result, the profit of exporting firms disappears completely. In addition, but not shown in the figure,

[17] It is possible that some fishermen sell the high quality shrimp to local consumers, but this amount would be very small compared to the quantity supplied to exporting firms. Therefore, the model normalizes the amount of the high quality of shrimp sold to local consumers to zero.

the firms have to suffer the loss due to the destruction of their stock and also have to lay off employees.

The ban also generates a loss to fishermen corresponding to the area $CDGF$ in the middle diagram. However, local consumers derive a welfare gain from the ban as they are now able to buy high quality shrimp. This gain, given by the area CDG, is less than the loss of the fishermen's producer surplus.

This is not, however, the end of the story. As good quality shrimp are now supplied to the local markets, the demand for its substitute (bad quality shrimp) D_b^d shifts to the left, leading to a further reduction of the welfare of the fishermen. During the fieldwork, we learned that some of them tried to limit these welfare losses by increasing their fishing intensity, see Sections 5 and 6 for details. We do not show this effect here as we think it is not essential for the current analysis.

4.3. Medium-run impacts of the ban

In 2005 the export ban was lifted, but the firms exporting frozen shrimp did not resume activities. The reasons for this failure, which were listed in Section3.4, are now illustrated in Panel (c).

The diagram on the right shows that, after the ban, the exporting firms faced costs c^{MR}, which were significantly higher than the pre-ban cost c. The reasons for the cost increase – which were detailed in Section 3.4 - can be summarized as follows: (i) The exporting firms needed to finance the additional physical and human capital required to meet the higher food safety standards. (ii) Even though the sector was upgraded, the precedent of the ban as well as some pending non-compliance issues had increased the perceived riskiness of the export activity. (iii) Related to the second point, the firms had to pay a higher interest rate on new loans from the banking sector (consistent with the lowering of the sector's credit rating; see our discussion in Section 3.2). (iv) If they resumed activities (instead of filing for bankruptcy), the firms would have to repay their high debt to the banking sector (resulting from the non-reimbursement of credit in the year of the ban).

Keeping the export price p_w and the markup ε fixed, these additional costs imply that the firms will only operate when they can purchase shrimp at a lower price $p_g^{X^{MR}}$. However, if $p_g^{X^{MR}}$ is less than the local market price $p_g^{d^{MR}}$, then all the good-quality shrimp will be sold locally. This scenario, depicted in the middle and right diagrams of Panel (c), corresponds to the information received during our field trip.

Our interviews with intermediate traders revealed that the local market for good-quality shrimp expanded since the ban, with increased sales to neighboring countries (Nigeria, Togo, Gabon and Ghana). This expansion led to a price increase in the local markets, such that $p_g^{d^{MR}} > p_g^{X^{MR}}$ (see the middle diagram). However, the traders also noted that this increase could not compensate for their loss of the European export market; partly because of the high transaction costs in the forms of border taxes and the poor transport infrastructure to the local markets. They also complained about price fluctuations in the local markets and the lack of timely payment (for the latter point, see also Allegre and Dupret, 2010).

Why don't the firms increase $p_g^{X^{MR}}$ a bit to beat local markets and still earn a small profit? In other words, why are firms not willing to operate with a lower profit margin? In our opinion, the answer lies in a wait-and-see strategic behavior on the part of the firms. The firms were waiting for the government to finance part of the new costs associated with compliance, to intervene in settling the outstanding debt with the banking sector, and to act as guarantor for new loans (and so to obtain lower interest rates).[18] In July 2008, the government announced at the Council of Ministers the decision to guarantee bank loans to the exporting firms of shrimp. It is not clear why this decision has not become effective (Allegre and Dupret, 2010). One pending issue is that exporting firms failed to justify the use of a soft government loan of 500 million XOF (≈ 763,000 €) they received in 2007-2008 in order to make the investments required for compliance with the EU standards. Another reason mentioned by the firms for delaying

[18] Exporting firms were expecting these arrangements because they learned that Senegalese firms received similar treatment and that the French Cooperation subsidized firms operating in fisheries in Senegal and Cote d'Ivoire when they faced problems with the implementation of standards.

their entry is related to the decrease of the world market price p_w due to increased international competition since the ban (especially from Asia). These developments put further downward pressure on $p_g^{X^{MR}}$ and thus discourage entry.

5. Evidence from a survey among fishermen and fishmongers

The model above shows that the ban led to a decline in the producer surplus of shrimp fishers. This surely implies an income loss in the short run. In the longer run, however, a number of fishermen may leave the shrimp supply chain and compensate their income loss with income from other activities. To assess whether fishermen face persistent income losses, we study their income and activity portfolio changes on the basis of data from a survey that was undertaken in 2009, six years after the imposition of the ban and four years after the ban was lifted. Section 5.1 briefly introduces the data; Sections 5.2 and 5.3 discuss the self-reported causes and consequences of the ban and coping strategies.

5.1. Data used

The households were selected from the 2006 fishery census, which recorded information on 27,568 small-scale actors, mostly fishermen and fishmongers, operating in the fishery sector of southern Benin. We took a random sample of 540 households, stratified geographically across 18 villages that are part of three administrative communes located on the three lakes: Lake Nokoué (So-Ava Commune); Lake Ahémé (Kpomasse Commune); and Lagune de Porto-Novo (Aguégués Commune). Within these households, we identified 516 fishermen and 394 fishmongers (from now on referred to as fishwives).

The location of the three communes and lakes is shown in Figure 4. The communes differ in a number of relevant aspects. So-Ava is located on the largest lake and is the most remote commune. It has many traditional fishing villages built on the water, resulting in pollution from human waste and lower quality of shrimp with respect to the EU standard. Kpomasse, although located furthest from the exporting firms, can easily be reached across land and is located at Lake Ahémé, which is a relatively small

lake that was the preferred supplier of the exporting firms because of the its highly appreciated quality of shrimp (reflected in a larger size and more reddish color of the shrimp). Aguegues is the least remote commune and provides shrimp of intermediate quality.

The household members were interviewed in the period March-July 2009, during the 2009 shrimp season, by the authors of this paper and a team of 30 enumerators and 4 supervisors. In order to collect accurate information on income and consumption, the households were visited every two weeks. During each of these visits, income and consumption data were recorded. In addition, a standard household module was implemented covering different topics at each visit, such as social capital, credit, annual income and economic activities, shocks and coping strategies, health and education. From the data, we found that household income in 2009 stemmed for more than 80% from the fishery sector of which 30% was accounted for by the shrimp subsector.

5.2. Self-reported causes and impacts of the ban

During the first survey visit, the fishermen and fishwives were asked to share their experiences regarding the ban. The following questions were asked:

(i) Are you aware that there has been a ban? (If no: move on to the next section; if yes, continue.)

(ii) What is the cause of the ban?

(iii) What impact did the ban have on your income immediately after the ban (in 2003) and today (in 2009)?

(iv) What explains this impact?

(v) If the impact was negative, how did the household react to cope with it, immediately after the ban (in 2003) and what is it doing today (in 2009)?

The answers to the first two questions are summarized in Table 1. We found that 82% of both the fishermen and fishwives knew about the ban at the time of the survey.[19] This

[19] Among the fifth that was not aware of the ban, a number of actors did not catch or trade shrimp (or did so prior to the ban) but specialize in other species (fish, oyster, crab). When excluding those actors, the

proportion varied across the communes. In So-Ava, the commune that is most isolated, only 68% of the fishermen and fishwives were aware of the ban. In Kpomasse and Aguegues, 81% and 97% of the fishermen and fishwives knew about the ban.

Regarding the second question about the cause of the ban (asked to those who knew about the ban), only 40% of the fishermen and 45% of fishwives report as a cause that "the food safety norms were not sufficiently respected"; while 20% said they had no idea why. In the remaining 30% to 40%, the answers varied widely, including "the Europeans no longer had money", "the firms went bankrupt", "the local authorities were arguing", "the European who bought the shrimp is on a holiday", "we need to provide food to Beninese markets (instead of European markets)", "it is because of the use of prohibited fishing gears" and "the Houedah are behind it".[20] These responses indicate that general awareness about the compliance issue is relatively low despite the efforts of the donors and the local authorities to involve the small-scale actors more in the good management of the supply chain, e.g., by conducting village-by-village information sessions.

Table 2, Panel A summarizes the self-reported income effect of the ban in 2003. Close to 59% of the respondents reported a *very* negative impact in the short run, and 26% report a *rather* negative impact. Approximately 9% report "no impact", and about 5% mention a positive impact. Corresponding well with its status as preferred supplier to the exporting firms, Kpomasse had the highest proportion of actors mentioning a strongly negative effect (84%), followed by Aguegues (56%) and So-Ava (33%).

When asked about the reason for the negative short-run impact of the ban, more than 70% of those who reported a negative impact attributed it to "a low price because of lack of purchasers". This is consistent with the price decrease that features in the model presented in Section 4.2. Other reported reasons are diverse and include "the market is far", "it is complicated now that we have to sell to Togolese, Gabonese and Nigerian markets", or "we have to throw away the shrimp or smoke them for lack of buyers of

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proportion of informed actors increases only slightly from 82% to 84% among fishermen and 88% among fishwives.

[20] The Houedah is a group which is competing for the fishery resources with the Goun and the Tofin, which are different but related groups speaking different dialects belonging to the same family of Gbe languages (Hounkpati, 1991).

fresh shrimp". Among the 5% who reported a positive impact, the reason mentioned is "new market opportunities", suggesting that a minority of the respondents could take advantage of the export market failure. From our interviews, we learned this was the case for larger intermediate traders who increased their interactions with markets in neighboring countries.

Panel B of Table 2 summarizes the self-reported assessment by the local actors on the ban's medium-term impact (6 years after the ban). When asked about the ban's income effect in 2009, up to 52% of the households still reported a very negative impact, and 30% reported a rather negative impact. The most frequently cited reasons for the persistent negative effect were the persistently low price and the difficulty of selling in distant markets.

5.3. Coping strategies and activity portfolio strategies

The persistent self-reported negative welfare impact suggests that the domestic and regional demand did not succeed in substituting for EU demand even after considerable time. It also indicates that fishermen households were unable to cope adequately with the drop in shrimp demand, for example, by substituting shrimp fishing with another activity, which would be the coping strategy *par excellence* for dealing with a persistent covariant shock.

It is well documented that, when faced with a non-negligible adverse income shock, households in developing countries resort to a wide range of coping strategies in order to smooth consumption, including self-insurance through dissaving, increased labor effort, migration and mutual insurance. The choice of strategy depends on the size and the type of the shock (Dercon, 2004). The export ban can be characterized as a covariant and highly persistent shock, i.e., many households within the same community were negatively affected at the same time and the shock was not limited to one point in time (exports were suspended for several consecutive months).

To understand how the small-scale producers in our sample reacted to this shock, we study their answers to the following question: "If the impact was negative, how did the household react to cope with it immediately after the ban (in 2003) and today (in 2009)?".

The answers are summarized in Table 3. Given that the shock was covariant and persistent, it is not surprising that the households in our sample rarely reported mutual insurance ("asking for help from friends and family") as a coping strategy, while "developing another activity" was frequently reported. Other coping strategies that were frequently reported were "no reaction", "selling assets", "consume less", "take consumption credit", "work more hours", and – to a lesser extent - "take child(ren) out of school". Much less frequently reported coping strategies include "reduce the number of children", "casual (agricultural) labor" and "migrate to Nigeria".

A number of these coping strategies reduce the household's capital, be it physical or human. Although they contribute to consumption smoothing in the short run, these strategies may negatively affect income in the longer run. Hence, the most viable coping strategy when faced with a prolonged negative demand shock for shrimp would be to switch to another activity. This conjecture finds support in the data. Among the 62 fishermen who reported having switched activities following the ban, only 39% reported a very negative impact of the ban in 2009 compared to an average of 51% (and over 70% for fishermen reporting the other three most frequent reactions: "no reaction", "asset sale", and "consume less").[21]

To investigate the effectiveness of an activity-portfolio change further, we analyze the data from a module on economic activities asking fishermen about their economic activities in 2002 and in 2009. Among the 62 fishermen who self-reported having switched activities following the ban, the large majority (77%) remained in the fishery sector by switching to fishing fish (instead of shrimp). Thus, they ended up competing with other fishermen for the scarce fishery stock. Only 14 fishermen who changed activities between 2002 and 2009 (23%) switched to activities outside the fishery sector. These fishermen reported a very negative income effect of the ban only in 29% of cases compared to 42% for those who switched activities within the fishery sector, which suggests that switching to the non-fishery sector was the most effective coping strategy.

[21] For fishwives, we find similar results. The 51 fishwives who changed activities reporting a very negative impact in 33% of cases compared to an average of 53%.

That this strategy was applied by only a handful of fishermen indicates that access to the non-fishing sector was constrained.[22]

6. Discussion and concluding remarks

Different country experiences illustrate that an export ban may act as a catalyst or as a barrier for a country's export sector. We studied the case of Benin's shrimp sector, which collapsed upon the 2003 export ban. Strikingly, the sector did not revive, even though the ban was lifted in 2005. We stress that the sector's dependency on the EU, its smallness, and Benin's poor institutional environment played critical roles.

Putting all of one's eggs in one basket is risky. Because of its reliance solely on the EU market, the ban on shrimp exports from Benin to the EU basically put the exporting firms out of business, which led to the current situation of unsettled debt. In its turn, this dependency on the EU market is explained by the underdevelopment of the regional market (regarding its purchasing power and infrastructure) as well as the size of the sector, which is limited by the capacity of the lakes.

Smallness also played a role in a more direct way. Complying with standards involves fixed costs (upgrading laboratories, training fishery experts and fishermen, etc.) which, in the case of a small sector, are shared by few actors. In a small sector, the potential total pay-off is also low in terms of both firm revenue and tax revenue for governments. This may greatly reduce the incentives for firms and governments to invest in a small export sector. In the case of Benin, donors incurred huge sunk costs in infrastructure for controlling, treating and transporting the shrimp from the lakes to the firms, but the firms and the government (e.g., as a potential guarantee for credit to the sector) were hesitant to take the further steps necessary to revive exports.

The institutional environment also plays a crucial role. As argued by Martinez and Poole (2004), the key to success in keeping up with the evolving EU standards lies in

[22] In a study on income diversification in the fishing communities in our sample, we explain the extremely low degree of income diversification among fishermen in terms of the remoteness of their communities, the difficulty of access to agricultural land, and especially the lack of schooling with close to 70% of active adults being illiterate (Stoop et al., 2013).

moving towards a new paradigm of competition between supply chains rather than competition between producers. In this new paradigm, the relationship between the different types of actors along the supply chain shifts from being purely transactional to becoming more co-operative. All the actors of a supply chain – the producers, suppliers and retailers – are inter-dependent managers of the quality of the same final product and the success of their combined management depends on the extent of the co-operation, information exchange and trust between them. These attributes are in short supply in Benin's shrimp sector as we could conclude from interviews with the firms, the competent authority (civil servants in the ministry of fisheries), and the fishermen from the different communities.

For example, when asked about the ban, only 33% of fishermen knew about it and the reasons for it. In addition, the fishing community is fractionalized between different ethnic groups and inter-group trust is very low. Also higher up in the supply chain, mistrust plays a role: following allegations of misuse of a soft government loan by the firms, the Beninese government was hesitant to continue to support the firms and was waiting for the results of the investigation by the national debt committee. Finally, lacking confidence in the capacity of the firms and governments to face up to the future financial and market challenges (without further extensive donor support), the banks were reluctant to provide credit to the sector.

What are the welfare implications of a ban at the level of small-scale producers? The last part of this paper points out that the stringent EU standards had an important and persistent negative impact on the income of fishermen and fishwives. The access to world markets, which translated into a perfectly elastic demand of exporting firms, assured daily market clearance for the fishermen. Being small, much poorer, and plagued by high transport and transaction costs and with limited access to inexpensive preservation technology, the domestic and regional markets could not take over this role. In addition, fishermen were constrained in their access to the non-fishery sector. As such, switching activities proved an effective coping strategy for only a handful of fishers and was insufficient to compensate for the loss in producer surplus. Instead, shrimp fishers

engaged in competition with fish fishers or intensified their shrimp fishing activity, thereby compromising the future fishery stock.

Is there a future for Benin's shrimp sector? Provided that the cold chain is respected by all the actors (including the fishermen and the intermediate traders), the control units and transfer platforms operate, and the firms' financial situation is sorted out, Benin possesses a very well-appreciated product that satisfies the highest food and safety norms. However, the question remains whether, given its institutional environment, Benin will be able to keep up with rapidly evolving EU norms and be able to (re)conquer the market and compete with the expanding Asian shrimp export with a small-size shrimp of standard quality but for a very low price. One strategy could be to stress the flavor and size of Benin's shrimp. In addition, the sector could also seek added value by aiming at labels for artisanal and/or environmentally sustainable fishing. However, the demanding administrative requirements and procedures to obtain special labels require skill and expertise that are far beyond the current capacity of actors in the sector.[23] Until the local capacity and coordination issues are resolved, the situation will remain frozen.

Another fundamental problem that needs to be addressed is overfishing. There is an urgent need for effective institutions to regulate Benin's fisheries and preserve the fishery stock for future generations. At present, such institutions are lacking and the pressure on the lake is mounting. Partly as a response to the ban, partly as a reaction to the degradation of the lakes' resources, fishers increased their fishing effort, by fishing during more hours a day but mostly by using more damaging fishing gears.[24] If continued

[23] For instance, Fair Trade Organizations require keeping records for all marketed shrimp in order to trace their origin to members of cooperatives.

[24] Especially the increased use of the *acadja* and the *medokpokonou* have contributed to the problem of overfishing and resource degradation. The acadja can best be described as 'private fishing ponds', constructed by placing wooden branches in the lake and fencing them with fishing nets. They cover an increasingly large share of the surface of major lakes, which reduces oxygen levels, retards water circulation and restricts the fishing area available for non-*acadja* owners. The *medokpokonou* is also a fixed fishing installation, but it is not closed by nets. Instead, nets, several meters long, are set in such a manner that the fish get trapped. Initially designed for catching shrimp, it has fine-mesh nets, which also trap young fish and fish eggs, thereby reducing the reproduction of the fishing stock. The *medokpokonou* also has direct negative externalities for other fishers because the nets are usually set out close to narrow channels and so catch virtually all the fish entering the lake and leaving few for fishermen further downstream. That

unregulated, the ecosystem will be affected, and the available shrimp stock may permanently decrease. Studying these issues is out of the scope of this paper but are addressed in, among others, Stoop et al. (2013) and Briones Alonso et al. (mimeo).

fishermen try to compensate their income loss by fishing more relates to the lack of effective institutions to regulate the fishing activity and to the severely constrained access to economic activities outside the fishery sector (see our discussion in Briones Alonso, et al., (mimeo) and Stoop et al., (2013).

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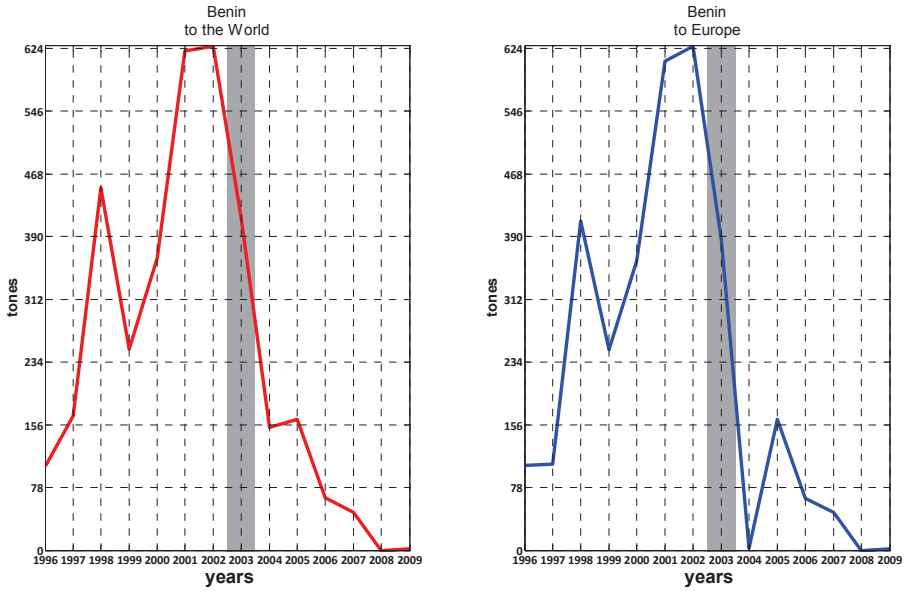
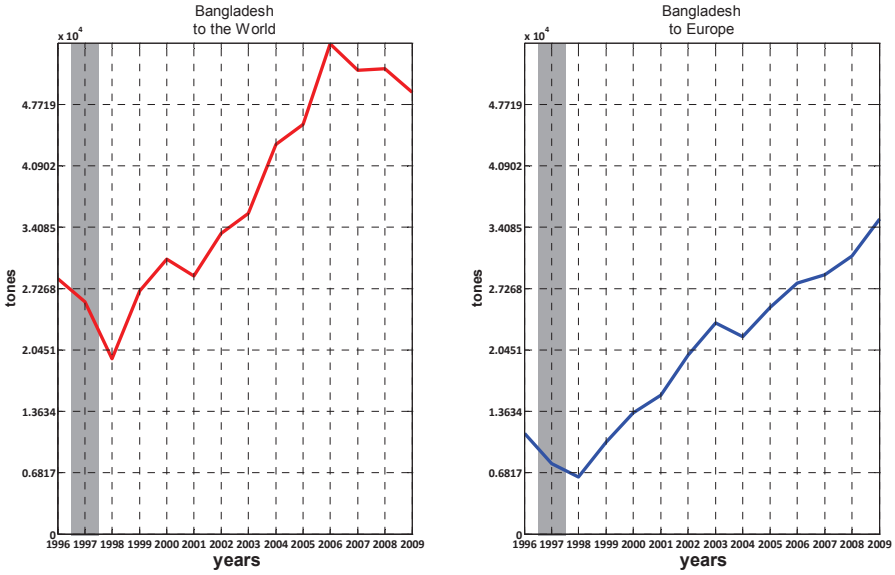
Figure 1: The Dynamics of Exports

a. Shrimp exports from Benin to the world and to the EU

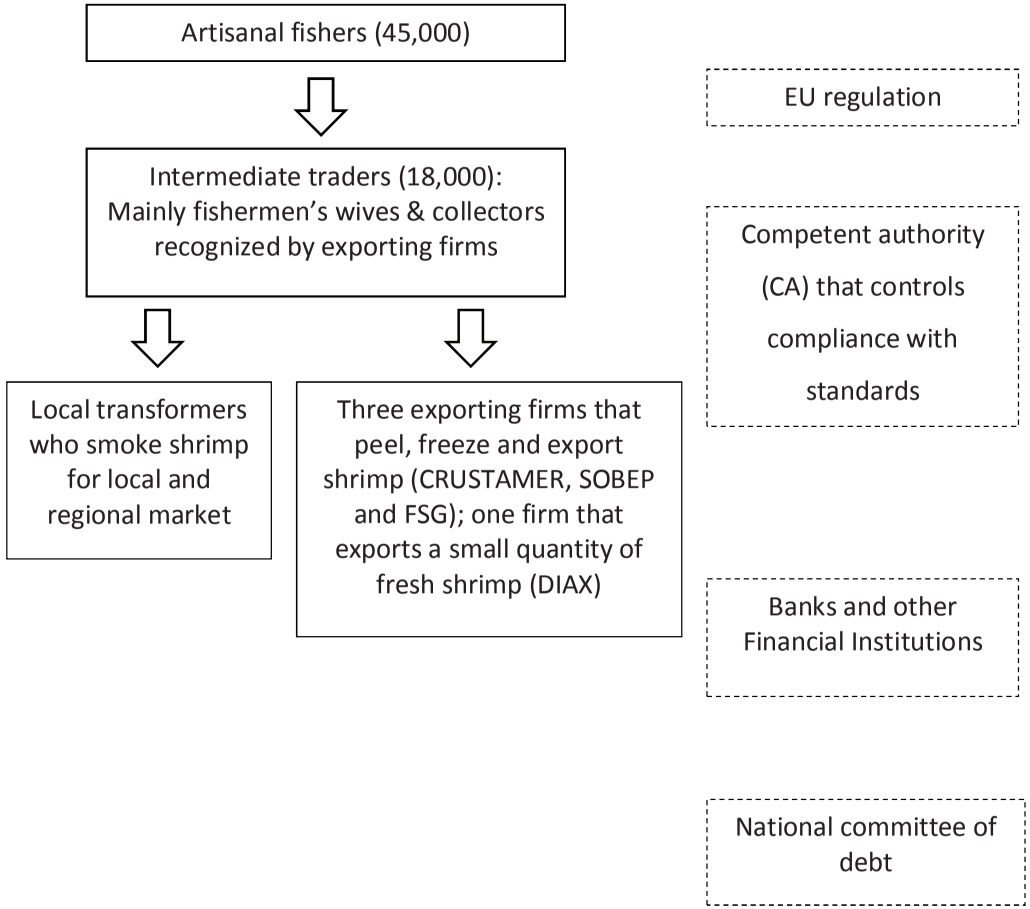


b. Shrimp exports from Bangladesh to the world and to the EU



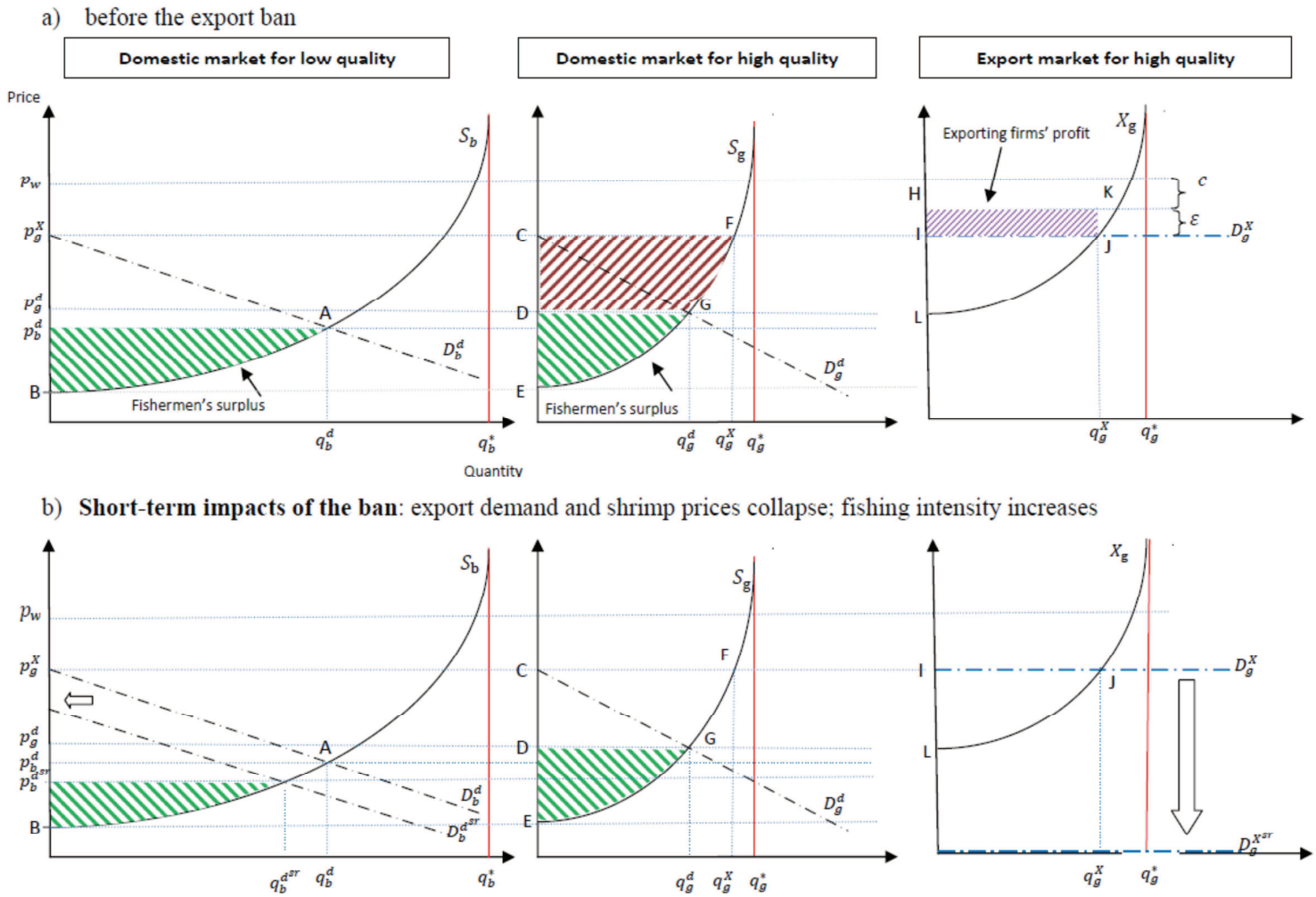
Notes: Export data is taken from the UN Comtrade database. The grey area shows the year of the EU ban.

Figure 2: Benin's inland shrimp supply chain



Source: Our own compilation of information from several reports (E.g., SFP, 2003 and EU-DG SANCO, 2003)

Figure 3: open-economy, demand-supply framework for the market for fresh shrimp in Benin



c) **Medium-run impacts of the ban**: domestic demand expands but limited; at high costs export firms cannot break-even

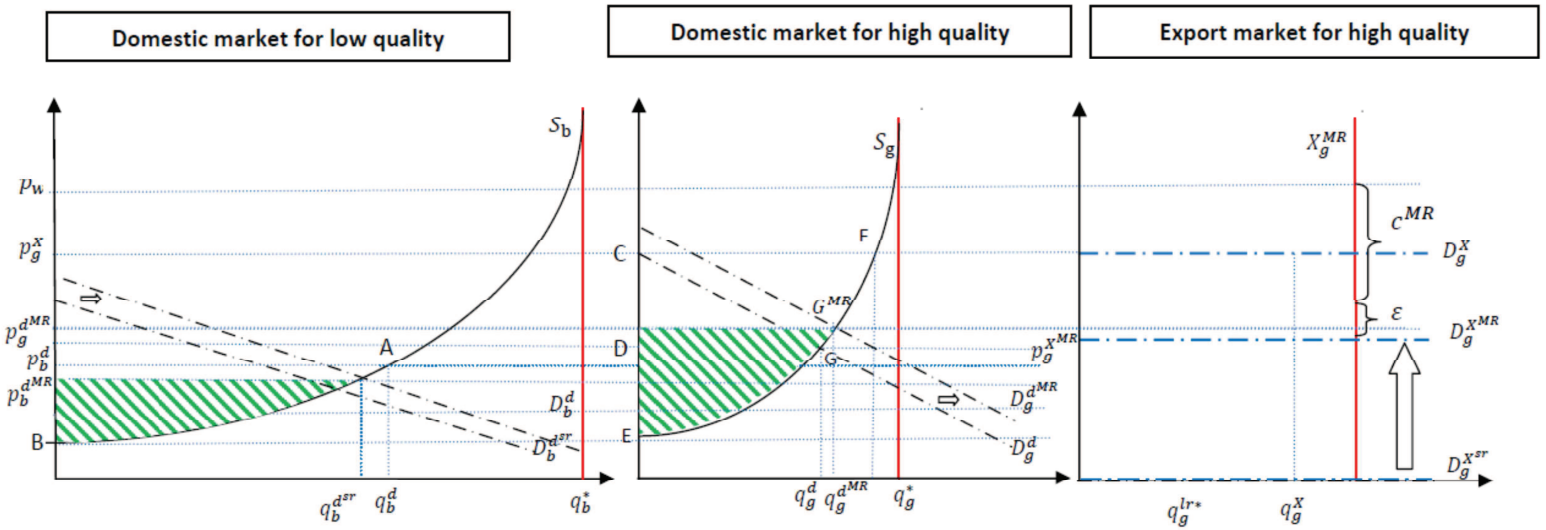
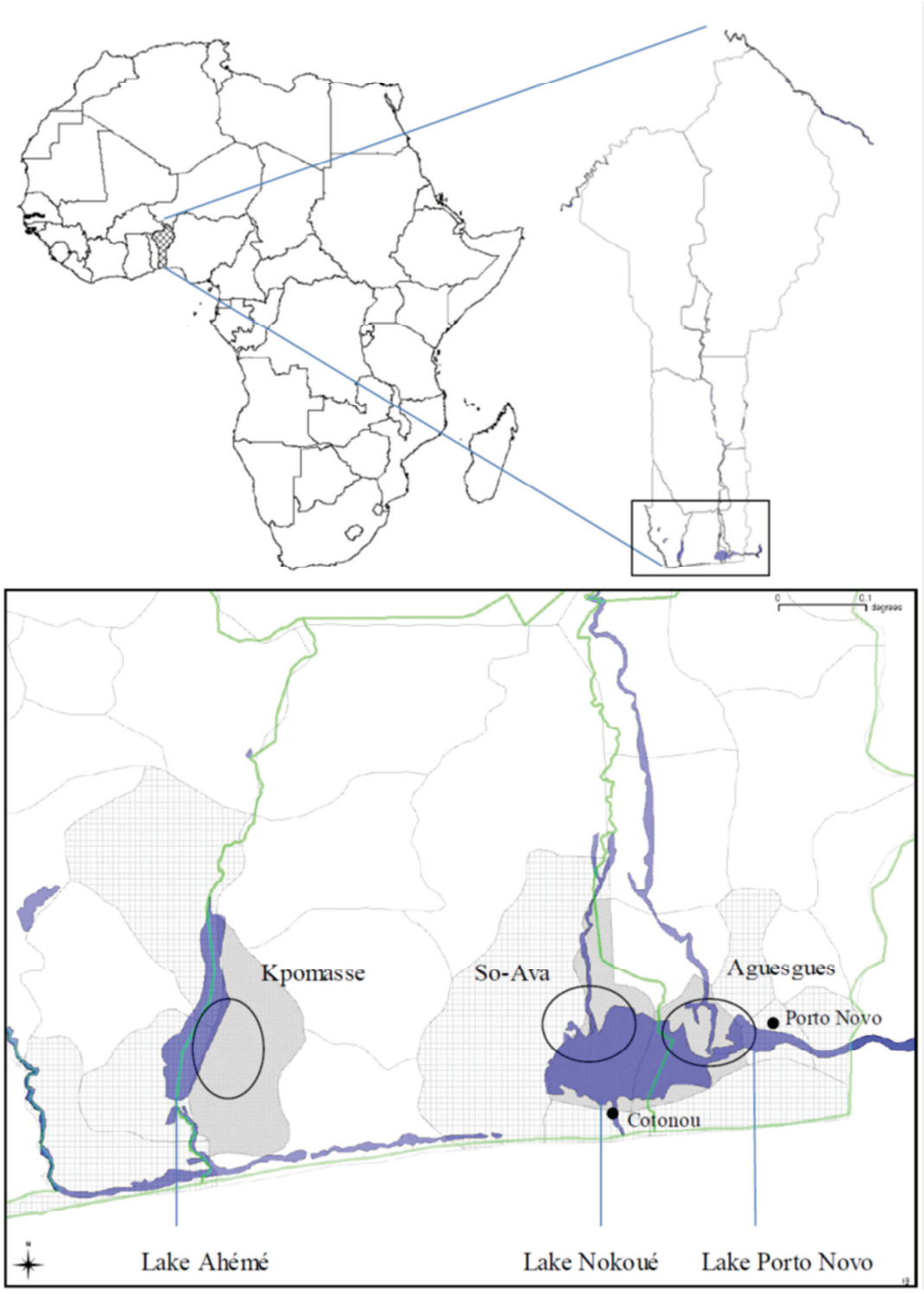


Figure 4: Map of survey area



Note: Kpomasse lays at Lake Ahémé, So-Ava at Lake Nokoué and Aguegues at the intersection of Lake Nokoué and Lagune de Porto-Novo

Table 1: What fishermen and fishwives know about the EU export ban

	Total	Fishermen	Fishwives	Kpomasse	So-Ava	Aguesgues
	"Are you aware that there has been a ban?" (%)					
Yes	82	82	82	81	68	97
No	18	18	18	19	32	3
Obs	910	516	394	299	306	291
	"What is the cause of the ban?" (%)					
The food safety norms were not sufficiently respected	42	40	45	61	26	38
I don't know	19	18	21	3	35	22
The Europeans no longer had money	10	9	12	14	7	11
The firms went bankrupt	12	12	13	6	19	13
The local authorities were arguing	7	10	4	13	2	6
Other	8	11	5	4	11	10
Obs	744	422	322	241	209	291

Source: household survey conducted in 2009 by the authors of this paper

Table 2: Self-reported assessment of the impact of the export suspension

Panel A: short-term (impact in in 2003) (%)						
	Total	Fishermen	Fishwives	Kpomasse	So-Ava	Aguesgues
Strongly negative	59	57	60	84	33	55
Rather negative	26	26	26	10	56	18
No impact	9	11	6	2	8	15
Rather positive	4	4	5	1	0	10
Strongly positive	1	0	2	2	0	1
I don't know	1	1	1	1	3	0
Panel B: medium-term (impact in 2009) (%)						
	Total	Fishermen	Fishwives	Kpomasse	So-Ava	Aguesgues
Strongly negative	52	51	53	66	36	51
Rather negative	30	29	31	22	40	29
No impact	11	13	9	8	9	16
Rather positive	4	5	4	2	10	2
Strongly positive	1	1	1	1	1	0
I don't know	2	2	2	0	4	1
Obs	743	422	321	241	208	283

Source: household survey conducted in 2009 by the authors of this paper

Table 3: Self-reported coping strategies used by fishers and fishwives upon the ban

	Fishermen				Fishwives			
	2003		2009		2003		2009	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%
No reaction	70	20	73	21	53	19	61	22
Asset sale	44	13	18	5	20	7	11	4
Consume less	61	18	56	16	61	22	43	15
Take consumption credit	31	9	24	7	24	9	30	11
Engage in other ec. act.	62	18	63	18	51	18	57	21
Work more hours	31	9	66	19	25	9	41	15
Take child out of school	23	7	10	3	6	2	8	3
Help from family or friends	12	3	14	4	23	8	14	5
Help from government or NGO	1	0	8	2	7	3	7	3
Other	13	4	16	5	8	3	6	2
Total	348	100	348	100	278	100	278	100

Source: household survey conducted in 2009 by the authors of this paper